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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,794	08/08/2006	Hironori Kumagai	10873.1941USWO	6450

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EXAMINER
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OSINSKI, MICHAEL S

ART UNIT	PAPER NUMBER
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2622

MAIL DATE	DELIVERY MODE
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06/24/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/597,794	<b>Applicant(s)</b> KUMAGAI ET AL.	
	<b>Examiner</b> MICHAEL OSINSKI	<b>Art Unit</b> 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 March 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This Office Action is in response to communications filed on 3/30/2009. Claims 1 and 3-10 are pending in this application.

#### ***Response to Arguments***

2. The Applicant's arguments with regards to the claims have been fully considered but are moot in view of the new ground(s) of rejection.

#### ***Drawings***

3. The drawings are objected to because Figures 19 and 20 should be labeled 'Prior Art' as they illustrate a conventional imaging apparatus and pixel shifting technique. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

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application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections – 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. ***Claims 1 and 3-5 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] in view of Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA].***

6. As to claim 1, Nonaka teaches a multi-eye imaging apparatus (Fig. 1) that comprises a plurality of imaging systems comprising optical systems (11 and 16) and imaging elements (12 and 17) that have different optical axes, wherein the imaging systems include a first imaging system (11, 12, and 21) having pixel shifting means of an actuator (21) for changing a relative positional relationship between an image of a subject (110) formed on the imaging element (12) and the imaging element, and a second imaging system (16 and 17) in which a relative positional relationship between

an image of a subject (110) formed on the imaging element (17) and the imaging element is fixed during time-series image capture (Col. 3, 29-53, Col. 4, 47-59).

Additionally, Nonaka discloses an image memory (19a) for accumulating a plurality of frames of image information captured in time series (Fig. 2, I0, I1) contained within a camera shake detection section (19) that compares the plurality of frames of image information accumulated in the image memory section with a comparison section (19b), moving direction calculation section (19c), and a moving amount calculation section (19d), and an image processing/forming section (22) that synthesizes the image signals contained within the image memory sections upon one another (Fig. 5, 24b), corresponding to combining the plurality of frames of images accumulated in the image memory (Col. 4, 9-46, Col. 6, 26-34).

It is however noted that Nonaka fails to disclose combining images after pixels are shifted relative to each other so the resolution of the combined image is higher than that of the plurality of frames of images.

On the other hand, AAPA discloses a technique called "pixel shift" (Fig. 20A-20C) for improving the resolution of an imaging apparatus. The technique involves shifting (Fig. 20B) the active region (2101) of an imaging element (P) to a different position relative to an initial position (Fig. 20A) in order to pick-up additional image data of a scene not originally captured by the imaging element. The images captured (pre-shift and post-shift) are combined and result in an image whose resolution is equivalent to an image captured using an imaging element that is doubled in size (Page 1, 0009-0012).

It would have been obvious to one having ordinary skill in the art at the time of invention to incorporate combining images after pixels are shifted relative to each other so the resolution of the combined image is increased as disclosed by AAPA to increase the resolution of the multi-eye imaging apparatus equipped with a pixel shifting means and image combining means of Nonaka because the prior art are directed towards imaging devices containing movable imaging elements used for capturing images of a scene and because the technique of combining images after pixels have been shifted in order to increase a resolution of an imaging element was recognized as part of the ordinary capabilities of one skilled in the art that would yield predictable a result of increasing the resolution of images captured by the multi-eye imaging apparatus to a resolution higher than that of the plurality of image frames that are synthesized by the image processing/forming section (22) of Nonaka.

7. As to claim 3, Nonaka teaches the change amount of the positional relationship by the actuator is determined based on the shake amount obtained by the shake detection section (19) (Col. 4, 29-59).

8. As to claim 4, AAPA discloses the pixels of the imaging element are shifted by  $1/2$  of a pixel in both the horizontal and vertical directions (Fig. 20B) (Page 1, 0010).

9. As to claim 5, the Nonaka reference discloses all claimed subject matter with regards to similar comments of claims 1 and 2. Additionally, Nonaka teaches a

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calculation control section (25) that calculates a magnitude of a parallax from images captured by the various imaging systems (Col. 7, 63-67, Col. 8, 1-6).

10. ***Claims 6 and 10 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] and Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA], as applied to claim 5, in view of Tamamura (US Patent 7,463,284) [hereafter Tamamura] filed on 11/15/2005.***

11. As to claim 6, it is noted that Nonaka and AAPA fail to teach an optimal image selecting means for selecting image information which is used in the combination of the image combining means based on the shake amount obtained by shake amount obtaining means and parallax amount obtained by parallax amount obtaining means.

On the other hand, Tamamura teaches a camera (Fig. 1) that combines images using an image composition unit (117) in order to form images free from image blur due to camera shake. Images captured by an image sensing unit (15) are processed by an image processor (112) and feature points of the image are extracted by a shift detector (113) and the coordinates of the extracted feature points are determined by a coordinate converter (114), the coordinates determining shift amounts between images. The images are stored within an image storage unit (115) and combinations of stored images are selected by a selector (116) and subsequently combined by the image composition unit. The size of the image comprising the combination of two previously

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stored images is calculated by an image size unit (118) and the calculated sizes for the synthesized images are compared by a comparator (120) that selects a synthesized image having the greatest size, corresponding to the least amount of shake between the two images, and outputs the image with the least amount of shake to recording and display units (122 and 121) (Col. 3, 13-18, Col. 4, 3-41).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a comparator to select image information to be used in a selected combination of image signals based on a detected amount of variation between the stored images as taught by Tamamura with the multi-eye imaging apparatus of Nonaka, modified with the teachings of AAPA, because the prior art are directed towards imaging devices that eliminate image shaking effects and because it would allow the device of Nonaka to obtain a more accurate position displacement calculation for an image sensor to be moved by an actuator by further analyzing camera shake after an initial compensation value for the movement of the actuator has been calculated and the image sensor has consequentially been moved, and incorporating the parallax amount into the decision as to which combination of images is to be used would allow the device of Nonaka to increase the accuracy of the position displacement calculation for an image sensor by taking into account the distance between images formed on the various image sensors.

12. As to claim 10, the Nonaka, AAPA, and Tamamura references disclose all claimed subject matter with regard to the comments of claims 4-6.



13. ***Claims 7-8 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] and Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA], as applied to claim 1, in view of Nakazono (Japanese Patent Publication 2003-134385) [hereafter Nakazono] published on 5/9/2003.***

14. As to claim 7, it is noted that Nonaka and AAPA fail to disclose means for discriminating different subjects wherein the shake amount obtaining means obtains a shake amount for each of the different subjects and the image combining means combines images for each of the different subjects.

On the other hand, Nakazono teaches a camera (Fig. 1) that captures an image using a CCD imager (1) and using an image composition device (4) that comprises a motion vector detecting element (Fig. 2, 11, Fig. 3) that uses two pictures to discriminate subject images (Fig. 5) and determines a shake amount for the subject using a motion vector calculation part (Fig. 3, 23) and the two images used to determine a shake amount of the subject of the image are combined (Fig. 15) into an output image using a synthesizing means (Fig. 14, 92) (Page 11, 0056-0058, Page 12, 0059-0060, Page 16, 0073-0075).

It would have been obvious to one having ordinary skill in the art at the time of invention to discriminate subjects of an image and obtain shaking amounts of the identified subjects as taught by Nakazono with the multi-eye imaging apparatus of

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Nonaka, modified with the teachings of AAPA, because the prior art are directed towards imaging devices that eliminate image shaking effects and because obtaining shake amounts, or movement amounts, of an imaged subject between two images would allow the device of Nonaka to determine an image shake amount for an image's subject as opposed to the entire image in order to compensate for an image where the subject itself is moving as opposed to the physical camera, resulting in an image free from shaking or blurring effects.

15. As to claim 8, the Nakazono reference discloses all claimed subject matter with regards to similar comments of claim 7. Additionally, Nakazono teaches dividing image information into a plurality of blocks (Fig. 8) and obtaining a shake amount for a plurality of blocks using block setting means (Fig. 3, 22) (Page 13, 0064-0065).

16. ***Claim 9 is rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] and Applicant's Admitted Prior Art (US PGPub 2007/0159535) [hereafter AAPA], as applied to claim 1, in view of Yu et al. (US Patent 6,611,289) [hereafter Yu] published on 8/26/2003.***

17. As to claim 9, Nonaka teaches the optical photographing lens (11) forms a main image of a subject (110) onto an image sensor (12), which captures all incident light and corresponding colors, and that light receiving lens (16) receives reflected luminous flux from the subject and an image sensor (17), which also captures all incident light and

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corresponding colors, is used to form images based on the reflected luminous flux and subsequently these images are used to determine moving direction of the image sensor (12) (Col. 3, 42-53, 66-67, Col. 4, 1-8, 20-28).

It is however noted that Nonaka and AAPA fail to disclose an imaging system for handling a red color, an imaging system for handling a green color, and an imaging system for handling a blue color, wherein, for at least one corresponding to one color of the imaging systems corresponding to the respective colors, the number of the imaging systems corresponding to the one color is two or more.

On the other hand, Yu teaches a camera (Fig. 3) with a plurality of imaging systems having different optical axes that are composed of an imaging system comprising of a lens (310) and an image sensor (302) for handling a red color, a lens (312) and an image sensor (304) for handling a green color, a lens (314) and an image sensor (306) for handling a blue color, and a lens (316) and an image sensor (308) for handling all colors of the visible light spectrum including the colors of the other imaging systems (Col. 4, 62-67, Col. 5, 1-39, 65-66, Col. 8, 59-61).

It would have been obvious to one having ordinary skill in the art at the time of invention to include separate and distinct imaging systems that each image a different RGB color and form a high-quality image and additionally include an imaging system that also images each of the RGB colors within a camera as taught by Yu with the multi-eye imaging apparatus of Nonaka, modified with the teachings of AAPA, because the prior art are directed towards imaging devices that include multiple imaging systems for imaging a single object and because such a camera configuration would allow the

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device of Nonaka to produce true color images with enhanced resolutions that are free from image/camera shake effects by using the RGB color imaging systems of Yu as the multi-eye imaging systems (main system 11 and 12, sub-sampling system 16 and 17) within the configuration of Nonaka to detect camera shake and subsequently calculate movement amounts for the monochrome and multicolor image sensors incorporated within the respective imaging systems.

### ***Conclusion***

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Osinski whose telephone number is (571) 270-

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3949. The examiner can normally be reached on Monday to Thursday 9 a.m. to 6 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lin Ye/  
Supervisory Patent Examiner, Art Unit 2622  
MO